

# Determinants of cervical *Chlamydia trachomatis* infection in Italy

The Italian MEGIC Group\*

## Abstract

**Objective**—to analyse the prevalence of cervical chlamydia infection and its determinants in an Italian population of women attending outpatients services for contraceptive counselling or routine gynaecological examination.

**Methods**—between November 1989 and November 1990 we conducted a cross-sectional study on the prevalence of cervical *Chlamydia trachomatis* infection among women attending the outpatients service of seven university clinics in Northern (three centres), Central (three centres) and Southern (one centre) Italy. Eligible for the study were subjects with symptomatic low gynaecological tract infection (a total of 2071 women), a history of recurrent abortions (two or more miscarriages and no livebirth (416 subjects)), or sterility (371 subjects), plus a sample of asymptomatic women observed for contraceptive counselling or routine gynaecological examination identified on randomly selected days at the participating centres (1321 subjects). During the gynaecological consultation women were asked about their general characteristics, reproductive history, contraceptive and sexual habits, and history of sexually transmitted diseases (STD) using a standard questionnaire. An endocervical specimen was obtained with a plastic swab. The direct smear immunofluorescent antibody test (IFA test) was used to detect chlamydia antigens.

**Results**—out of the 2071 women with genital infection, 104 (5.0%) had cervical chlamydia infection; the corresponding percentages were 4.6 (19/416), 5.4 (20/371) and 3.9 (51/1321) respectively in women with recurrent abortions, sterility and in asymptomatic subjects. The risk of chlamydia infection was higher in women reporting a history of STD: in comparison with those without a history of STD, the relative risk of chlamydia infection was 1.4 (95% confidence interval, CI, 1.0-2.0). Among women reporting current use of a contraceptive method the risk of cervical chlamydia infection was lower in current users of barrier methods; in comparison with oral contraceptive users, the RR was 0.4 (95% CI, 0.2-0.8) in barrier methods users and 0.5 (95% CI, 0.2-1.1) in intrauterine device or other methods users. No consistent

relationship emerged with age, reproductive history or number of sexual partners over the last 12 months.

**Conclusion**—in this Italian population the frequency of cervical chlamydia infection appeared to be lower than in other selected groups from Northern European and American countries. Users of barrier contraception methods were at reduced risk of infection.

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## Introduction

*Chlamydia trachomatis* is one of the most common of the bacterial sexual transmitted diseases (STD).<sup>1</sup> Since most female lower genital tract chlamydial infections are asymptomatic, universal screening of sexually active women has been recommended.<sup>2,3</sup> In view of the costs of the screening, the identification of women at higher risk of the infection may help to focus specific chlamydia control programs.

It has been suggested that young age, high number of sexual partners, never use of barrier contraceptive methods, unmarried status are associated with an increased risk of chlamydia infection.<sup>3-6</sup> However, available data are scanty and inconsistent. Furthermore these factors may act differently in populations with different prevalences of the infection. To offer further data on the issue, we present the results of a large multicentric cross-sectional study on the prevalence of cervical chlamydia infection conducted in Italy on women with symptomatic genital infection, infertility problems or attending the outpatient services of a network of centres for contraceptive counselling or routine gynaecological examination.

## Subjects and methods

Between November 1989 and November 1990 we conducted a cross-sectional study of the prevalence of cervical *Chlamydia trachomatis* infection among women attending the outpatients service of seven university clinics in Northern (three centres), Central (three centres) and Southern (one centre) Italy. Eligible for the study were subjects with symptomatic low gynaecological tract infection, a history of recurrent abortions (two or more miscarriages and no livebirth) or sterility, plus a random sample of asymptomatic women observed for contraceptive counselling or routine gynaecological examination

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identified in randomly selected days at the participating centres.

A total of 4179 subjects (mean age 32 years) entered the study. Of those, 2071 (mean age 32 years) had symptomatic gynaecological infection (i.e. women reporting vaginal discharge and/or genital tract itching, dyspareunia and/or acute pelvic pain), 416 (mean age 31 years) a history of recurrent abortion, 371 (mean age 31 year) a history of sterility, and 1321 (mean age 33 years) were "asymptomatic".

Participation was total for symptomatic subjects and women with infertility problems, and greater than 95% for asymptomatic subjects.

During the gynaecological consultation women were asked by the physician about their general characteristics, reproductive history, current contraceptive habits, number of sexual partners over the last 12 months and history of STD using a standard questionnaire. An endocervical specimen was obtained with a plastic swab. The direct smear immunofluorescent antibody test (IFA test, Syva Microtrak Chlamydia) was used to detect chlamydia antigens. The criterion for a positive result was the presence of more than five elementary bodies.

#### Data analysis

We computed percentages of positive cervical chlamydia infection in strata of different criteria for entry into the study. We also computed the odds ratios, as an estimator of relative risks (RR), together with the 95% confidence intervals (CI), of chlamydia infection adjusted for criteria for entry into the study, by the Mantel Haenszel procedure.<sup>7</sup> The significance of the linear trend in risk, when appropriate, was assessed with use of the test described by Mantel.<sup>8</sup> In the computation of RR, the potential reciprocal confounding effects of other variables (such as centre and age) were controlled for by using stratification and the Mantel-Haenszel procedure. However, since adjustments for most covariates did not materially change the RR, estimates adjusted for criteria for entry into the study only were chosen for presentation here.

#### Results

Table 1 shows the distribution of women according to the result of the IFA test and criteria for entry into the study. Out of the 2071 women with genital infection 104 (5.0%) had cervical chlamydia infection, the

corresponding percentages were 4.6 (19/416), 5.4 (20/371) and 3.9 (51/1321) respectively in women with recurrent abortions, sterility and in asymptomatic subjects. The relation between age, reproductive history, a history of sexually transmitted diseases, the number of sexual partners, current contraceptive habits, and cervical chlamydia infection are shown in table 2. Women reporting two or more spontaneous abortions had, in comparison with those reporting no miscarriage, a RR of chlamydia infection of 1.5; the trend in risk was, however, not significant ( $\chi^2$  trend  $0.1 \geq 2$  miscarriages,  $p = \text{NS}$ ). The risk of chlamydia infection was higher in women reporting a history of STD; in comparison with those without a history of STD, the RR of chlamydia infection was 1.4 (95% CI, 1.0–2.0). Among women reporting current use of a contraceptive method, the risk of cervical chlamydia infection was lower in current users of barrier methods: in comparison with oral contraceptive users, the RR was 0.4 in barrier methods users (95% CI 0.2–0.8).

No consistent relationship emerged with age, parity, history of induced abortion and number of sexual partners over the last 12 months.

#### Discussion

In this cross-sectional study of women attending a network of outpatient gynaecological services in Italy for selected gynaecological conditions, the prevalence of cervical chlamydia infection was about 5% in women self-referring for symptomatic lower gynaecological tract infection. The estimate was largely similar in women with infertility problems, being respectively 4.6% and 5.4% in women with recurrent abortions or sterility, and only slightly lower in asymptomatic women observed for routine gynaecological examination or contraceptive counselling. The risk of chlamydia infection was higher in women with a history of STD and lower in barrier contraceptive users. No consistent association emerged between chlamydia infection and age, reproductive history and number of reported sexual partners over the last 12 months.

Before discussing these findings potential bias should be considered. The study population consisted of women self-referring for various conditions to a network of teaching hospitals. Thus, in strict terms, they cannot be considered representative of the Italian general population. Nevertheless, the centres were distributed in all the three main areas of the country and no marked differences in the estimated prevalences were observed between them. Furthermore, despite the potentially selective mechanisms, inferences based on comparisons of the characteristics of infected and non-infected women can provide quantitative evidence for characterising women at risk of this infection.

Recall bias should not be a major problem for information such as age and reproductive history. Some underreporting can be suggested for the number of sexual partners, but

Table 1 Distribution of screened women according to the presence of cervical chlamydia infection and criteria for entry into the study.

	Negative		Positive
	No	No	(%)
Symptomatic genital infection	1967	104	(5.0)
Recurrent abortion	397	19	(4.6)
Sterility	351	20	(5.4)
Asymptomatic subjects	1270	51	(3.9)

Table 2 Distribution and corresponding relative risk of screened women according to the presence of chlamydia infection and selected characteristics.

	Cervical chlamydia infection		Relative risk* (95% C.I.)
	No	Yes	
Age (years)			
≤25	882‡	52	1†
26–35	1872	81	0.7 (0.5–1.0)
≥36	1230	61	0.9 (0.6–1.4)
Parity			
0	1861	89	1†
1	839	42	1.1 (0.7–1.6)
2	852	40	1.0 (0.6–1.4)
≥3	413	23	1.2 (0.7–1.9)
Number of spontaneous abortions			
0	3227	152	1*
1	490	24	1.0 (0.6–1.6)
≥2	271	18	1.5 (0.7–3.0)
Number of induced abortions			
0	3470	170	1†
≥1	483	24	1.0 (0.6–1.6)
History of sexually transmitted diseases			
No	155	3276	1*
Yes	40	611	1.4 (1.0–2.0)
Number of sexual partners over the last 12 months			
0–1	3594	177	1†
≥2	261	11	0.8 (0.5–1.6)
Current contraceptive methods			
Oral	500	37	1†
Barrier methods	348	11	0.4 (0.2–0.8)
IUD/others	305	7	0.5 (0.2–1.1)

\*Adjusted for diagnosis at entry. CI indicates confidence interval.

†Reference category.

‡In some cases the sum of strata does not add up to the total because of missing values.

this bias is unlikely to act differently in infected and non-infected subjects. Confounding should not explain the findings, since adjustment for potential covariates, including criteria for entry and centre did not change the estimated relative risk. In the recurrent abortion group we considered women with two spontaneous abortions and no live birth, so it is possible that this group includes women with casual repeated miscarriages. This may underestimate the role of chlamydia infection in repeated abortion.

Published studies on chlamydia infection have shown large differences in the prevalence estimates that are probably mainly attributable to different selective mechanisms in the study populations. For example, the estimated prevalence of chlamydia infection was about 9%–10% in two multicentre studies conducted in urban family planning clinics in U.S.A.,<sup>6,9</sup> but in these studies large differences in the prevalence of chlamydia infection (from 6% to 23%) were observed among collaborating centres.<sup>9</sup> A study of female college students showed a prevalence of 12%.<sup>4</sup> Higher prevalences have been reported among women attending STD clinics.<sup>5</sup> All these estimates, generally based on Northern European or American countries tended, however, to be higher than our overall value of about 5%.

There is general evidence that chlamydia infection is less frequent in users of barrier contraceptive methods.<sup>4–6</sup> Prevalences of chlamydia infection in these women were very low in studies conducted in STD<sup>5</sup> or family planning clinics<sup>6</sup> or among college students.<sup>4</sup> In view of the potential relationship between sexual practices and use of contraceptive methods we have analysed the role of contraceptive methods on chlamydia infection risk in sexually active subjects using contraceptive methods only. In this subgroup the risk of chlamydia infection was about half in barrier method users, an estimate largely consistent with previous published results.

Another factor associated in our analysis with the frequency of chlamydia infection was a history of STD. Previous studies did not consistently confirm this finding. For example, no association emerged in a study conducted in the U.S.A.<sup>6</sup> We did not find any relation between chlamydia infection and reported number of sexual partners. Previous data on the issue are not consistent.<sup>4,6</sup>

In conclusion, in this Italian population, selected for genital infection, infertility problems or observed for routine gynaecological examination, the frequency of cervical chlamydia infection appeared to be lower than in other selected group from Northern European and American countries. In this study the major determinant of the infection was to be never users of barrier contraceptive methods and to report a history of STD.

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